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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,025	07/02/2001	Toshiaki Shinohara	210096US2	7453
22850	7590	11/17/2004	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			VU, QUANG D	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/895,025

Applicant(s)

SHINOHARA, TOSHIAKI

Examiner

Quang D Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6-10 is/are allowed.
- 6) ☒ Claim(s) 1-5 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10/08/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3, 4, 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,291,065 to Arai et al. in view of US Patent No. 6,297,549 to Hiyoshi.

Regarding claim 1, Arai et al. (figure 10) teach a semiconductor device comprising:

a semiconductor element (5);

a metal block (330) having a first surface and a second surface opposite to the first surface;

an aluminum wire (5g) having an electrode terminal joined to the first surface of the metal block (330); and

a ceramic substrate (301) having metal layers (312, 340) formed on both surfaces, one of the metal layers (312) joined directly by a first jointing material to the second surface of the metal block (330).

It is inherent that the semiconductor element (5) having an electrode for the I/O connection.

It is inherent that the semiconductor element (5) and the electrode are joined to the first surface of the metal block (330) through a second jointing material (a material layer is under the semiconductor element [5]) for the interconnection between the semiconductor element and the external device.

Arai et al. differ from the claimed invention by not showing the first jointing material being a metallic material. However, Hiyoshi (figures 2B-C) shows the first jointing material being a metallic material (copper plate [332] formed on the ceramic substrate [31] by metallic material such as silver brazing) (column 6, lines 61-65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Hiyoshi into the device taught by Arai et al. because it increases the dissipated heat from the semiconductor device.

Regarding claim 3, Arai et al. teach the semiconductor element includes a plurality of semiconductor elements (5);

the metal block (330) and the ceramic substrate (301) are separated per insulation unit of at least one of the plurality of semiconductor elements (5);

the metal block (330) is provided to be in correspondence with at least one of the plurality of semiconductor elements (5); and

the ceramic substrate (301) extends over all of the plurality of semiconductor elements (5) for forming the insulation unit.

Regarding claim 4, Arai et al. inherently teach the metal block (330) includes a surface having a region larger than that of the second jointing material (a material layer is under the semiconductor element [5]), which is in contact with the metal block (330).

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Regarding claim 5, Arai et al. teach a gap between the metal block (330) and the semiconductor element (5) becomes wider as a distance from a center of the semiconductor element (5) becomes longer; and the gap is filled with the second jointing material (a material layer is under the semiconductor element [5]).

Regarding claim 11, Arai et al. teach the semiconductor element includes a plurality of semiconductor elements (5);

the metal block (330) and the ceramic substrate (301) are separated per insulation unit of at least one of the plurality of semiconductor elements (5);

the ceramic substrate (301) is provided to be in correspondence with at least one of the plurality of semiconductor elements (5); and

the metal block (303) extends over all of the plurality of semiconductor elements (5) for forming the insulation unit.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. in view of Hiyoshi, and further in view of US Patent No. 5,488,256 to Tsunoda.

Regarding claim 2, the disclosures of Arai et al. and Hiyoshi are discussed as applied to claims 1, 3, 4, 5 and 11 above.

The combined device differs from the claimed invention by not showing the metal layers formed on the both surfaces of the ceramic substrate are the same with each other in thickness. However, Tsunoda (figure 12B) shows the metal layers (metal layer [103] and metal wiring [104]) formed on the both surfaces of the ceramic substrate (102) are the same thickness (column 1, lines 42-44). Therefore, it would have been obvious to one having ordinary skill in the art at

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the time the invention was made to incorporate the teaching of Tsunoda into the device taught by Arai et al. and Hiyoshi because it reduces stress caused in the interconnect substrate.

***Allowable Subject Matter***

4. Claims 6-10 are allowed.

***Response to Arguments***

Applicant's arguments filed 09/23/04 have been fully considered but they are not persuasive.

It is argued, in page 7 of the remarks, that Arai et al. do not teach or suggest the first jointing material being a metallic material. This argument is not convincing because the combined device (Arai et al. and Hiyoshi) shows the first jointing material being a metallic material for the reason that is discussed above.

***Conclusion***

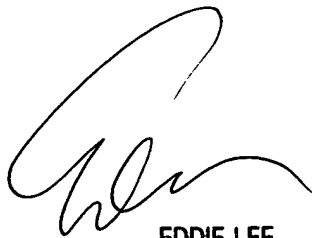
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 571-272-1667. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qvu  
November 10, 2004

A handwritten signature in black ink, appearing to read 'Eddie Lee', with a large, sweeping loop at the top.

**EDDIE LEE**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**